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### REMARKS

Reconsideration and allowance in view of the foregoing amendments and the following remarks are respectfully requested.

By this amendment, claims 1, 3 and 5-27 are pending, claims 1, 3, 5, 7-16, 18, 19 and 21-24 are amended, claims 2 and 4 are canceled without prejudice or disclaimer and claims 25-27 are added. The specification is amended to correct a typographical error.

#### Rejection of Claims 1, 10, 11 and 16-21

On page 2 of the Office Action, the Examiner rejected claims 1, 10, 11 and 16-21 under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2002/0143526 to Coorman et al. ("Coorman '26") in view of IEEE GLOBECOM-96 to Sanneck et al. ("Sanneck"). Applicant submits that amended claim 1 obviates the rejection. The amendments to claims 10, 11, 16, 18, 19 and 21 were made to improve the presentation of the claims and do not narrow the scope of the claims.

Amended claim 1 is directed to a method for enhancing speech intelligibility of a speech signal. The method includes, among other things, dynamically determining a scaling factor for a segment of speech, which further comprises setting the scaling factor to a second value, wherein time compression occurs during a steady-state vowel.

Amended claim 1 includes the features of original claim 4. On page 9 of the Office Action, the Examiner admitted that Coorman '26, U.S. Patent No. 6,665,641 to Coorman et al. ("Coorman '41") and Sanneck do not disclose or suggest time compression. The Examiner relied on U.S. Patent No. 6,104,822 to Melanson et al. ("Melanson"), at col. 2, lines 57-60 to disclose or suggest compression. Applicant respectfully disagrees with the Examiner.

Melanson, at col. 1, lines 8-24, discloses:

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A common problem associated with sensorineural hearing loss is recruitment. A hearing impaired person suffering from recruitment has an elevated threshold for soft sounds. This means that soft sounds which are audible to a person with normal hearing will have to be made louder in order to be heard by the hearing impaired person. However, with recruitment, loud sounds may be just as loud for the hearing impaired person as for the person with normal hearing. This represents a loss of dynamic range for the hearing impaired. This loss of dynamic range may vary with frequency. For example, at low frequencies the hearing impaired person may have nearly the same dynamic range as the person with normal hearing, but at high frequencies the dynamic range of the hearing impaired person may be considerably reduced. This impaired dynamic range is often referred to as the residual dynamic range.

Thus, Melanson discloses that a person suffering from recruitment has a loss of dynamic range that may vary with frequency. The loss of range may typically occur at high frequencies among hearing impaired individuals.

Melanson, at col. 2, lines 41-60, discloses:

The compression process requires a means for measuring the power of the input signal and generating a dynamically varying gain as a function of this input power. This gain is then applied to the signal which is delivered to the ear. When the input power is low, this gain will generally be high so that soft sounds are made louder. When the input power is high, this gain will generally be low so that loud sounds are not made too loud. The measure of input power requires averaging over time. The time span of the averaging defines a compression time constant. If the time span is very long then the compressor will react slowly to changes in input power level. This is sometimes referred to as Automatic Gain Control (AGC) where time constants of one to two seconds are typical. When the time span of the averaging is short the compressor will react quickly to changes in input power level. With a time span of approximately five to fifty milliseconds, the compressor may be referred to as a syllabic rate compressor. A syllabic rate compressor will limit the gain of a loud vowel sound while amplifying a soft consonant which immediately follows it.

Thus, Melanson discloses that compression relates to dynamically varying signal gain as a function of the power of signal input. The gain is then applied such that soft sounds are made louder and loud sounds are not made too loud. To measure input power, the input power is averaged over time. The time span for averaging defines a compression time constant. However, a compression time constant is not equivalent to time compression. When the time span is about five to fifty milliseconds, the compressor may be called a syllabic rate compressor.

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A syllabic rate compressor limits the gain of loud vowel sounds while amplifying a soft consonant following the loud vowel sound. Therefore, Applicant submits that a syllabic rate compressor is quite different from time compression. Therefore, Melanson fails to disclose or suggest that dynamically determining a scale factor for a segment of speech comprises setting the scale factor to a second value, wherein time compression occurs during the steady-state vowel, as required by claim 1.

Because Melanson, as well as Coorman '26, Coorman '41 and Sanneck fail to disclose or suggest that dynamically determining a scale factor for a segment of speech comprises setting the scaling factor to a second value, wherein time compression occurs during the steady-state vowel, Applicant submits that claim 1 is patentable over Coorman '26, Coorman '41 and Sanneck, as well as Melanson. Therefore, Applicant respectfully requests that the rejection of claim 1 be withdrawn.

Claims 10, 11 and 16-21 depend from claim 1 and are patentable over the cited references for at least the reasons discussed with respect to claim 1. Therefore, Applicant respectfully requests that the rejection of claims 10, 11 and 16-21 be withdrawn.

### Rejection of Claim 2

On page 8 of the Office Action, the Examiner rejected claim 2 under 35 U.S.C. 103(a) as allegedly being obvious over Coorman '26 in view of Sanneck and further in view of U.S. Patent No. 6,665,641 to Coorman et al. ("Coorman '41"). Applicant submits that claim 2 was canceled without prejudice or disclaimer thereby making the rejection moot. Applicant, therefore, respectfully requests that the rejection of claim 2 be withdrawn.

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**Rejection of Claims 3 and 4**

On page 9 of the Office Action, the Examiner rejected claims 3 and 4 under 35 U.S.C. 103(a) as allegedly being unpatentable over Coorman '26, Sanneck, Coorman '41 and Melanson. Applicant respectfully traverses the rejection.

Claim 4 was canceled without prejudice or disclaimer thereby making the rejection of claim 4 moot. Applicant respectfully requests that the rejection of claim 4 be withdrawn. However, amended claim 1 is equivalent to original claim 4 and is patentable over the cited references for at least the reasons discussed above with respect to claim 1.

Claim 3 depends from amended claim 1 and is patentable over the cited references for at least the reasons discussed with respect to claim 1. Further, claim 3 also recites that time compression occurs during an approximate next two thirds of the TSMS. This feature is not disclosed or suggested by the cited references. Therefore, Applicant respectfully requests that the rejection of claim 3 be withdrawn.

**Rejection of Claims 5 and 6**

On page 10 of the Office Action, the Examiner rejected claims 5 and 6 under 35 U.S.C. 103(a) as allegedly being unpatentable over Coorman '26, Sanneck and U.S. Patent No. 5,828,994 to Covell et al. ("Covell"). Claims 5 and 6 depend from amended claim 1. Applicant submits that amended claim 1 obviates the rejection.

Claims 5 and 6 depend from claim 1 which is patentable over Coorman '26, Coorman '41, Sanneck and Melanson for at least the reasons discussed above with respect to amended claim 1. Covell also fails to disclose or suggest that dynamically determining a scale factor for a segment of speech comprises setting the scaling factor to a second value, wherein time compression occurs during the steady-state vowel, as required by amended claim 1.

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For at least the reasons discussed above, Applicant submits that claims 5 and 6 are patentable over the cited references and respectfully requests that the rejection of claims 5 and 6 be withdrawn.

**Rejection of Claims 12-15**

On page 11 of the Office Action, the Examiner rejected claims 12-15 under 35 U.S.C. 103(a) as allegedly being obvious over Coorman '26 in view of Sanneck. Applicant submits that amended claim 1 obviates the rejection with respect to claims 12, 14 and 15. Applicant traverses the rejection with respect to claim 13.

Claims 12-15 depend from amended claim 1 and are patentable over Coorman '26 in view of Sanneck for at least the reasons discussed with respect to claim 1. Therefore, Applicant respectfully requests that the rejection of claims 12-15 be withdrawn.

Applicant further submits that claim 13 is also patentable for reasons of its own. For example, claim 13 recites that performing syllable segmentation on a frame of the speech signal comprises detecting abrupt changes in frequency-domain characteristics of the speech signal.

On page 11 of the Office Action, the Examiner admitted that Coorman '26 does not disclose or suggest detecting changes in frequency domain characteristics. However, on page 11 of the Office Action the Examiner alleged that Sanneck, at page 50, right column, 3<sup>rd</sup> paragraph, discloses or suggests detecting abrupt changes in frequency-domain characteristics of the speech signal. Applicant disagrees.

Sanneck discloses a new time-scale modification technique with a Waveform Similarity Overlap Add (WSOLA) algorithm (see Sanneck, section 3.1). On page 50 of Sanneck, right column, 3<sup>rd</sup> paragraph, Sanneck discloses:

Four speech signals with different pitch frequencies (two male and two female speakers), sampled at 8 kHz, were used. The new Time-scale Modification technique (TM) was compared to Silence Substitution (S), Pattern Matching (PM)

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and Pitch Waveform Replication (PWR) using 40 test conditions of 10 seconds each. Thirteen non-expert listeners were asked to judge overall quality on a five-category (Mean Opinion Score) scale, comparable to test schemes used in [1], [2], [7] and [8]. Additionally the presence of the disturbance components “tinny, metal”, “interrupted, clicking” and “echoing, reverberating” for each condition was judged.

Thus, Sanneck discloses a group of non-expert listeners listening to speech signals that were processed with a new WSOLA technique to conceal audio packet loss and with other techniques to conceal audio packet loss. The presence of disturbances, such as “tinny, metal”, “interrupted clicking” and “echoing, reverberating” for each condition was judged. However, judging the presence of disturbances, such as “tinny, metal”, “interrupted clicking” and “echoing, reverberating” is not the equivalent of performing syllable segmentation on a frame of the speech signal, where the performing comprises detecting abrupt changes in frequency-domain characteristics of the speech signal. In fact, Sanneck was completely devoid of any disclosure or suggestion of the required feature of claim 13. For at least the above-mentioned reasons, Sanneck is patentable over the cited references.

#### **Rejection of Claims 7 and 8**

On page 12 of the Office Action, the Examiner rejected claims 7 and 8 under 35 U.S.C. 103(a) as allegedly being unpatentable over Coorman '26 in view of Sanneck and further in view of U.S. Patent Application Publication No. 2003/0072464 to Kates et al. (“Kates”). Applicant submits that amended claim 1 obviates the rejection.

Amended claims 7 and 8 depend from claim 1 and are patentable over Coorman '26 and Sanneck for at least the reasons discussed with respect to claim 1. Kates fails to satisfy the deficiencies of Coorman '26 and Sanneck. Therefore, Applicant respectfully requests that the rejection of claims 7 and 8 be withdrawn.

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### Rejection of Claim 9

On page 14 of the Office Action, the Examiner rejected claim 9 under 35 U.S.C. 103(a) as allegedly being unpatentable over Coorman '26 in view of Sanneck and Kates and further in view of U.S. Patent No. 5,729,658 to Hou et al. ("Hou").

Claim 9 depends from claim 8 and is patentable over Coorman '26, Sanneck and Kates for at least the reasons discussed with respect to claim 8. Hou fails to satisfy the deficiencies of Coorman '26, Sanneck and Kates. Therefore, Applicant respectfully requests that the rejection of claim 9 be withdrawn.

### Rejection of Claims 22-24

On page 14 of the Office Action, the Examiner rejected claims 22-24 under 35 U.S.C. 103(a) as allegedly being unpatentable over Coorman '26 in view of Sanneck and Coorman '41 and further in view of U.S. Patent No. 5,903,655 to Salmi et al. ("Salmi"). Applicant submits that amended claims 22-24 obviate the rejection.

Claims 22-24 recite features similar to those of claim 1 and are patentable over Coorman '26, Sanneck, Coorman '41 for reasons similar to those discussed with respect to claim 1. Salmi fails to satisfy the deficiencies of Coorman '26, Sanneck and Coorman '41. Therefore, Applicant respectfully requests that the rejection of claims 22-24 be withdrawn.

### New Claims 25-27

New claims 25-27 are directed to a method which includes, among other things, performing syllable segmentation on a frame of a speech signal in order to detect a syllable, where syllable segmentation further includes detecting abrupt changes in frequency domain characteristics of the speech signal. Applicant submits that this feature is similar to the feature of

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claim 13, previously discussed, and is patentable at least for reasons similar to those discussed with respect to claim 13.

### CONCLUSION

Having addressed all rejections and objections, Applicant respectfully submits that the subject application is in condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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